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Application Number	09/883,520
Filing Date	June 18, 2001
First Named Inventor	John C. Parsons
Art Unit	1794
Examiner Name	Peter Y. Choi
Attorney Docket Number	1931.VIN (EM-052)

ENCLOSURES (Check all that apply)

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

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Date	June 9, 2008	Reg. No.	31,158

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: :
John C. Parsons et al. : Examiner: P. Choi
U.S. Serial No. 09/883,520 : Group Art Unit: 1794
Filed June 18, 2001 :
Docket No. 1931.VIN (EM-05-2) :
For: WATER DISPERSIBLE, SALT :
SENSITIVE NONWOVEN MATERIALS :

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SUBSTITUTE BRIEF ON APPEAL UNDER 37 CFR §41.37(c)

Sir:

This *Substitute Brief on Appeal* is submitted in response to the *Notification of Non-Compliant Appeal Brief* mailed May 9, 2008. Applicant submitted its original *Brief on Appeal Under 37 CFR §41.37(c)* on April 23, 2008.

This response is believed timely. If any additional fees are due or an additional *Extension of Time* is required, please consider this paper a *Petition* therefor and charge fees related to this *Brief* to our Deposit Account No. 50-0935.

I. REAL PARTY IN INTEREST

The real party in interest in this case is Celanese International Corporation, *Assignee* of Record.

The *Assignment* recordation to Celanese International Corporation was recorded on March 2, 2005 under Reel No. 015819 / Frame No. 0210.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals, interferences or judicial proceedings related to, or which will affect, or which will be affected by, or which will have a bearing on the Board's decision in this *Appeal*.

III. STATUS OF CLAIMS

Claims 1, 7, 14, 15 and 17 have been canceled. Claims 2-6, 8-13, 16 and 18-27 are pending in this case and are on appeal. Claims 8, 10, 13, 18-24, 26 and 27 stand rejected under 35 USC §102(b)/103 over United States Patent No. 5,521,266. Claims 8, 10, 13, 18-23, 26 and 27 stand rejected under 35 USC §102(b)/103 over United States Patent No. 5,631,317. Claims 8, 10, 13, 18-23, 26 and 27 stand rejected under 35 USC §103 over United States Patent No. 5,631,317, in view of United States Patent No. 5,521,266. Claims 2-6, 9, 11, 12, 16 and 25 stand rejected under 35 USC §103 over United States Patent No. 5,521,266 in view of United States Patent No. 5,976,694. Claims 2-6, 9, 11, 12, 16 and 25 stand rejected under 35 USC §103 over United States Patent No. 5,631,317 in view of United States Patent No. 5,976,694. Claims 2-6, 9, 11, 12, 16 and 25 stand rejected under 35 USC §103 over United States Patent No. 5,631,317 in view of United States Patent No. 5,521,266, in further view of United States Patent No. 5,976,694. A complete listing of claims on appeal is provided in Appendix VIII.

IV. STATUS OF AMENDMENTS

An *Amendment* correcting a typographical error in Claim 8 and missing commas in the claims was filed on April 21, 2008. That *Amendment* was entered for purposes of this Appeal on May 28, 2008 and the attached listing of claims reflects those amendments.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention claimed in this case relates to nonwovens with emulsion binders (i.e., latexes) with salt-sensitive properties that disperse into discrete particles in the presence of water (without elevated salt levels). The nonwovens are thus dispersible without the need to dissolve the polymer binder; a feature not even remotely suggested in the art. The binders include a salt-sensitive latex polymer binder that comprises a polymer component which is polymerized in the presence of a colloid stabilizer in preferred cases. Either the latex resin or the stabilizer can provide the surprising dispersibility.

Details as to the claimed subject matter on appeal appear in the following table which sets forth the independent claims on appeal and maps those claims to the specification.

Claim Summary Mapping Independent Claims to Specification

<p><u>Claim 22</u> A non-woven material comprising:</p> <ul style="list-style-type: none"> a) a web of fibers; and b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises: <ul style="list-style-type: none"> i) a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer <li style="text-align: center;">and ii) a polymeric colloid component, <p>wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and</p> <p>wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.</p>	<p>The subject matter of Claim 22 is described in the application as filed, page 2, lines 10-21, as well as paragraph 15 of the application as published:</p> <p>[0015] The polymer is dispersible, rather than soluble, in water. Dispersible, as used herein, means that in tap water, a film formed from the polymer breaks into small discrete pieces or particles that can be filtered out. These pieces are capable of being separated from the water. While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive emulsion polymers useful in the present invention are described in U.S. patent application Ser. No. 09/823,318, incorporated herein by reference.</p> <p>The colloid feature is found at page 4, lines 16-19. The nondispersibility feature is found at page 2, line 24 - page 3, line 1.</p>
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Claim Summary Mapping Independent Claims to Specification (cont'd)

<p><u>Claim 23</u> A non-woven material comprising:</p> <p>a) a web of fibers; and</p> <p>b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:</p> <p>i) a polymer component which includes at least one hydrophilic monomer selected from the group consisting of acidic monomers containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof; and at least one non-hydrophilic monomer selected from the group consisting of (meth) acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof,</p> <p style="text-align: center;">and</p> <p>ii) a polymeric colloid component,</p> <p>wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and</p> <p>wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.</p>	<p>The subject matter of Claim 23 is described in the application as filed, page 2, line 10-21, page 4, line 22 – page 5, line 10, as well as paragraph 15 of the application as published:</p> <p>[0015] The polymer is dispersible, rather than soluble, in water. Dispersible, as used herein, means that in tap water, a film formed from the polymer breaks into small discrete pieces or particles that can be filtered out. These pieces are capable of being separated from the water. While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive emulsion polymers useful in the present invention are described in U.S. patent application Ser. No. 09/823,318, incorporated herein by reference.</p> <p>The nondispersibility feature is found at page 2, line 24 – page 3, line 1. The colloid feature is found at page 4, lines 16-19.</p>
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Claim Summary Mapping Independent Claims to Specification (cont'd)

<p><u>Claim 26</u> A non-woven material comprising:</p> <ul style="list-style-type: none"> a) a web of fibers; and b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and <p>wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.</p>	<p>The subject matter of Claim 26 is described in the application as filed, page 2, lines 10-21, as well as paragraph 15 of the application as published:</p> <p>[0015] The polymer is dispersible, rather than soluble, in water. Dispersible, as used herein, means that in tap water, a film formed from the polymer breaks into small discrete pieces or particles that can be filtered out. These pieces are capable of being separated from the water. While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive emulsion polymers useful in the present invention are described in U.S. patent application Ser. No. 09/823,318, incorporated herein by reference.</p> <p>The nondispersibility feature is seen at page 2, line 24 – page 3, line 1.</p>
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Claim Summary Mapping Independent Claims to Specification (cont'd)

<p><u>Claim 27</u> A non-woven material comprising:</p> <ul style="list-style-type: none"> a) a web of fibers; and b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and <p>wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt; and</p> <p>wherein the films are further characterized in that divalent ions do not inhibit redispersibility in water.</p>	<p>The subject matter of Claim 26 is described in the application as filed, page 2, lines 10-21, as well as paragraph 15 of the application as published:</p> <p>[0015] The polymer is dispersible, rather than soluble, in water. Dispersible, as used herein, means that in tap water, a film formed from the polymer breaks into small discrete pieces or particles that can be filtered out. These pieces are capable of being separated from the water. While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive emulsion polymers useful in the present invention are described in U.S. patent application Ser. No. 09/823,318, incorporated herein by reference.</p> <p>The nondispersibility feature is seen at page 2, line 24 – page 3, line 1.</p> <p>The divalent ion feature is incorporated by reference from copending application Serial No. 09/540,033, now United States Patent No. 6,683,129 on page 6, lines 19-21. The '129 patent provides description at Col. 4, lines 19-48, reproduced immediately following this table.</p>
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Unlike conventional water-soluble polymers, the aqueous emulsions of the present invention do not require divalent ion inhibitors. Film formation of latexes differs from film formation of solution polymers since particle coalescence is needed to form a film of high cohesive strength in emulsion polymers. For solution polymers, particle coalescence is not necessary because the solvent acts as a plasticizer which aids in the film formation by allowing polymer chains to mix and entangle. For emulsion polymers, the cohesive strength of the polymer film is reduced if the particles do not fully coalesce because of the reduction of chain entanglements. For emulsion polymers, the surface active layer remains as an interfacial boundary between particles and prevents full chain entanglement to the extent observed from solution polymers. As a result, films derived from the aqueous emulsions of the present invention will readily disperse in the presence of water. In addition, the novel polymer film will also disperse in hard water since divalent ions do not inhibit the redispersability by the film derived from emulsions. In contrast, for polymer films derived solution, hard water is less effective in solubilizing the polymer since divalent ions inhibit the movement of the highly entangled polymer chains. For films derived from solution polymers, ion regulating agents are required to enhance the solubilization in hard water. This is the main reason why the aqueous emulsions of the present invention do not require a divalent ion inhibitor (sequestering agent) to aid in the redispersability in tap water, especially hard water. Preferably the particle size of the water-dispersible copolymer is from about 0.05 micron to about 0.8 micron.

ADDITIONAL EVIDENCE SUBMITTED BEARING UPON PATENTABILITY

In this case, one *Declaration* under 37 CFR § 1.131 and four (4) *Declarations* under 37 CFR §1.132 were submitted, setting forth unexpected results and providing comment as to content of the references. Copies are provided in Appendix IX hereto. As to unexpected, superior results, the *Declaration Under 37 CFR § 1.132* of John C. Parsons, dated September 12, 2005 is perhaps most pertinent since it distinguishes solution polymer binders as taught by the *Komatsu et al.* reference. Note particularly paragraph 6:

It is unexpected based on his experience, and based on *Cole et al.* that emulsion binders including polymers which are not fully *water-soluble* can form emulsion residue binders which readily *disperse in water* but that the *dispersibility is salt-sensitive* as is claimed in the above referenced application. This is a superior result because of the enhanced processability of emulsion binders and their shipping and handling advantages noted above. The result is unexpected because the non-water soluble polymers of the present invention have much lower water

solubility than the acrylic acid, highly water soluble polymers disclosed by *Cole et al*, for example; yet the binders are nevertheless dispersible in tap water and non-dispersible in salt solution. One of skill in the art would not expect this result; especially because of the fact the polymers are not water soluble.

Note, also, the Declaration Under 37 CFR § 1.132 of Steven J. Pauls dated July, 23, 2007, paragraph 5, concerning the Lau reference which does not even teach or relate to salt sensitive compositions:

5. That United States Patent No. 5,521,266 does not contain a description of an emulsion polymerized polymer which is dispersible in water such that a film breaks into small pieces and can be filtered out. Examples 1-3 of the '266 patent involve solution polymers which dissolve in water and accordingly cannot be dispersible as defined above. Examples 4 and 5 of the '266 patent involve emulsion polymers having the composition of Table 4.2, Col. 15 of the '266 patent...*Note* that the polymers are mostly alkylated organic esters and contain only 0, 1 or 2% methacrylic acid. Based on his experience, it is clear to him that these emulsion polymers are not dispersible in water, nor would their dispersibility change in response to salt concentration. Accordingly, the products of the Present Invention are not suggested by the reference in any way.

As to sufficiency of the evidence presented in the record, it is noted here briefly that even if a *prima facie* case is made out, "the *prima facie* case is not a stone wall against which rebuttal evidence is tested; patentability is determined by a preponderance of all of the evidence." *In re Glaug*, 62 USPQ2d 1151, 1153 (CAFC 2002). The expert comment on the references and the evidence of unexpected, superior results is particularly compelling in this case. All claims should be allowed for the reasons discussed below.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Applicant appeals the following rejections, set forth in more detail in the *Final Rejection* of September 24, 2007:

A. Claims 8, 10, 13, 18-24, 26, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by, or alternatively under 35 U.S.C. 103(a) as obvious over, United States Patent No. 5,521,266 to *Lau*;

B. Claims 8, 10, 13, 18-23, 26, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by, or alternatively under 35 U.S.C. 103(a) as obvious over, United States Patent No. 5,631,317 to *Komatsu et al.*;

C. Claims 8, 10, 13, 18-23, 26, and 27 are rejected under 35 U.S.C. 103(a) as being obvious over *Komatsu et al.* in view of *Lau.*;

D. Claims 2-6, 9, 11, 12, 16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Lau*, as applied to claims 8, 10, 13, 18-24, 26, and 27 above, in view of United States Patent No. 5,976,694 to *Tsai et al.*;

E. Claims 2-6, 9, 11, 12, 16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Komatsu et al.*, as applied to Claims 8, 10, 13, 18-23, 26, and 27 above, in view of *Tsai et al.*; and

F. Claims 2-6, 9, 11, 12, 16 and 25 are rejected under 35 USC §103(a) as being unpatentable over *Komatsu et al.* in view of *Lau* as applied to Claims 8, 10, 13, 18-23, 26 and 27 above in further view of *Tsai et al.*

VII. ARGUMENT

The present invention relates to nonwoven products with emulsion binders that are salt triggerable in that the products are dispersible (as opposed to soluble) in water, but not salt solutions. Thus the products are “flushable” and will not clog plumbing or foul septic systems in use and differ markedly from the art cited in that films of the binder polymer are dispersible, rather than soluble in tap water and are further characterized in that divalent ions do not inhibit redispersibility in water. Claims 22 and 27 are representative:

22. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer
 - and
 - ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are ***dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out***, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

27. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and

wherein said latex polymer composition forms films that ***are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out***, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt; and

wherein the films are further characterized in that divalent ions do not inhibit redispersibility in water.

Note, also, that the emulsion polymerization processes used to make the latex binder of the invention impart critical structure and attributes to the polymer, and ultimately to the non-woven web, which are important in salt-sensitive binder applications, and readily distinguish it from similar resins which are solution polymerized. The distinction is noted in the pending application at page 4, lines 4-15:

While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water.

Summary of reasons for allowance

Before discussing the rejections under separate headings, it is noted that the rejections in this case are without merit. The prior art does not disclose, teach, or suggest the invention claimed. The *Lau* reference does not relate to salt sensitive products at all and is not relevant to the claimed subject matter. Nor is *Komatsu et al.* *Komatsu et al.* relates to water soluble solution polymers for salt sensitive products and as such teaches away from the claimed subject matter, which relates to non-water soluble compositions or latexes that are made to be dispersible in water. The rejections are based on improbable speculation and need to be reversed. MPEP §2112, part (IV), specifically prohibits making speculative rejections and labeling them “inherent” as the Examiner has done:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the *inherency* of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because *inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art*); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). *"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a*

given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently). (emphasis provided)

The obviousness rejections in this case are likewise improbable speculation and should be reversed as well. It is apparent from the record that none of the references disclose or teach the claimed subject matter and that the rejections are hindsight. The prohibition against using hindsight is well established and was confirmed in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1397 (U.S. Sup. Ct. 2007):

A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 [141 USPQ 549] (CA6 1964))).

as well as the Examination Guidelines published by the Office on October 10, 2007, Federal Register Vol. 72 No. 195, page 57529, item G:

...G. Some Teaching, Suggestion, or Motivation in the Prior Art That Would Have Led One of Ordinary Skill to Modify the Prior Art Reference or To Combine Prior Art Reference Teachings To Arrive at the Claimed Invention

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Office personnel must then articulate the following:

(1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; ...

There is no relevant teaching in the prior art as to combining references or modifying the prior art to arrive at the claimed invention. Indeed, the obviousness rejections rely on a combination of references at best representing an incomplete reconstruction of the claimed

subject matter contrary to established principles of law, that is, an obviousness rejection is improper when the cited art does not teach *each and every element* as specifically claimed in the application (see MPEP § 2143.03 reproduced in part below):

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

In other words, *all* of the claim limitations need to be considered, including the functional features of the products. In this regard, Counsel notes *In re Goffe*:

[W]e cannot agree with the board's determination that the claims are inclusive of materials which would not apparently be operative in the claimed process. *** Having stated the objective *** together with the process steps, use of materials which might prevent achievement of the objective *** can hardly be said to be within the scope of the claims.

Id. At 431 (citing *In re Geerdes*, 180 USPQ 789, 793 (CCPA 1974)).

The Examiner treats applicants' discovery that emulsion compositions can be made useful as salt sensitive binders as part of the prior art for purposes of obviousness. It is not. Unrecognized properties are just that—unknown and not available as prior art in connection with an obviousness rejection. No reference even remotely suggests an emulsion, i.e. latex binder that is salt-sensitive. Use of previously unknown information is improper hindsight. This is also an error warranting reversal of all of the obviousness rejections. Consider, *Van Veen v. United States*, 156 USPQ 403, 405-406 (Ct. Cl. 1967) as to the unavailability of unrecognized properties as prior art:

It is incorrect to hold that an invention was obvious when made, simply because the invention is simple in nature and is easily understood when described in a patent specification. Experience has shown that some of the simplest advances have been the most nonobvious. The prior art, in addition to the Daiber '380 patent mentioned above, cited by the defendant, provides a prior art base which renders the distinctions

between the prior art and the subject invention even more significant. None of the prior art cited by defendant copes with the problem of heat loss through the peripheral seams of the sleeping bag. Defendant says that under the rule of *General Electric Co. v. Jewel Incandescent Lamp Co.*, 326 U.S. 242, 247-49, 67 USPQ 155, 157-158 (1945), it is of no moment that the prior art (particularly MIL-B-830) failed to recognize that seams of this type would prevent or diminish heat loss. 1 But the Supreme Court has also indicated that "accidental results, not intended and not appreciated, do not constitute anticipation." *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 66 (1923); See also *Tilghman v. Proctor*, 102 U.S. 707, 711 (1880). In the *General Electric* case, the court found that the new use, advantage, or quality was apparent in view of the prior art (see 326 U.S. at 248, 67 USPQ at 157). **In the present case, it was not obvious to convert the special 30-inch seam of the Military Specification, even though it happened to be insulated, into the overall peripheral sleeping bag seams of the plaintiff's patent. In that respect the unrecognized quality (i.e., heat-loss prevention) inhering in the short seam of the Military Specification was merely "accidental" and no bar.**

The Examiner's speculative contentions as to the content of the references are contrary to the sworn statements of practitioners with over 20 years experience in the field. This is still yet another error warranting reversal of the rejections in this case because the Examiner has failed to accord the *Declaration* evidence due weight.

The obviousness rejections should also be reversed in view of the unexpected, superior results. This is still yet a further error requiring reversal of the rejections.

The six (6) rejections are discussed under separate headings below with respect to particular claim groupings for purposes of this appeal.

A. Claims 8, 10, 13, 18-24, 26 and 27 are novel and nonobvious over United States Patent No. 5,521,266 to Lau

Turning first to United States Patent No. 5,521,266 to *Lau*, the '266 patent discloses the emulsion polymerization of hydrophobic hydrocarbon monomers using cyclodextrin. The '266 *Lau* patent is directed to a method for forming polymers from hydrophobic monomers. The

emulsion polymerization approach taught involves dispersing the hydrophobic monomer and transporting it to the forming polymer. The process disclosed in that patent generates latex, and utilizes cyclodextrin to transport the monomer through the water phase to the polymer phase. The disclosed method utilizes macromolecular organic compounds which have a hydrophobic cavity to complex monomers which have low water solubility. The presence of cyclodextrin facilitates the transport of hydrophobic long alkyl chain monomers through the aqueous phase so that they can be homo- or copolymerized in a conventional emulsion polymerization process. This enables the formation of polymers from low water solubility monomers by emulsion polymerization. Nowhere suggested are salt sensitive products having claimed features of this application. The polymers disclosed in the '266 patent do not resemble the emulsion polymer binders used in this invention as is discussed in more detail in the attached *Declaration under 37 CFR §1.132* of Steven J. Pauls dated July, 2007. In particular, the polymers are not dispersible in water into discrete particles as is claimed. *Note* that the *Declaration* specifically states that *Lau* does not disclose such polymers in paragraph 5 thereof, noted above on page 4 of this *Brief*, and reproduced in full, below.

5. That United States Patent No. 5,521,266 does not contain a description of an emulsion polymerized polymer which is dispersible in water such that a film breaks into small pieces and can be filtered out. Examples 1-3 of the '266 patent involve solution polymers which dissolve in water and accordingly cannot be dispersible as defined above. Examples 4 and 5 of the '266 patent involve emulsion polymers having the composition of Table 4.2, col. 15 of the '266 patent:

TABLE 4.2

Emulsion Polymer	LA	LMA	BA	MMA	MAA	2-EHA	VA	
1C-E (Comparative)	50	0	0	49	1	0	0	20
2C-E (Comparative)	0	45	10	44	1	0	0	
1-E	20	0	25	54	1	0	0	25
2-E	40	0	20	39	1	0	0	
3-E	40	0	3	56	1	0	0	
4-E	40	0	0	59	1	0	0	
5-E	45	0	0	54	1	0	0	
6-E	50	0	0	49	1	0	0	
7-E	50	0	48	0	2	0	0	30
8-E	98	0	0	0	2	0	0	
9-E	0	20	30	49	1	0	0	
10-E	0	20	35	44	1	0	0	
11-E	0	35	5	64	1	0	0	
12-E	0	35	0	64	1	0	0	
13-E	0	40	39	20	1	0	0	35
14-E	0	40	10	49	1	0	0	
15-E	0	40	29	30	1	0	0	
16-E	0	40	5	54	1	0	0	
17-E	0	40	0	59	1	0	0	
18-E	0	45	15	39	1	0	0	
19-E	0	45	10	44	1	0	0	
20-E	0	45	0	54	1	0	0	40
21-E	0	50	0	49	1	0	0	
22-E	0	50	48	0	2	0	0	
23-E	20	0	0	0	0	0	80	
24-E	0	20	0	0	0	0	80	
25-E	0	0	10	44	1	45	0	
26-E	0	0	20	0	0	0	80	45

Note that the polymers are mostly alkylated organic esters and contain only 0, 1 or 2% methacrylic acid. Based on his experience, it is clear to him that these emulsion polymers are not dispersible in water, nor would their dispersibility change in response to salt concentration. Accordingly, the products of the Present Invention are not suggested by their reference in any way.

The "all elements rule" is clearly not satisfied. The Examiner admits as much in stating that the reference is silent as to claim features. Nor is the claimed subject matter suggested in any way. The *Lau* reference does not even relate to salt-sensitive products. All claims are patentable over *Lau*.

1. Claims 8, 10, 13 and 18-24 are also novel and nonobvious over *Lau* because a colloid stabilizer is required.

Claims 22 and 23 (from which Claims 8, 10, 13, 18-21, and 24 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious by *Lau* which does not disclose or teach that a colloid stabilizer can be critical to salt-sensitivity and re-dispersibility in water.

2. Claim 27 is also novel and nonobvious over *Lau* because of divalent ion resistance.

One of the surprising results found in connection with the present invention is that divalent ions, such as those found in “hard” water do not inhibit re-dispersibility of the products. That feature is embodied in Claim 27, which is also patentable over *Lau* by virtue of this feature in addition to the reasons stated above.

B. Claims 8, 10, 13, 18-23, 26, and 27 are novel and nonobvious over United States Patent No. 5,631,317 to *Komatsu et al.*

The ‘317 *Komatsu et al.* reference discloses solution-based salt-sensitive polymers which are solution polymerized in the presence of organic solvent. These polymers are unlike the emulsion binders used in the nonwovens of this invention as discussed in the July, 2007 *Declaration under 37 CFR §1.132*. This reference was also discussed at some length in the *Declaration under 37 CFR §1.132* that was filed with an *RCE* in this case (the “*March 2007 Declaration*”).

The above points are underscored by the *March 2007 Declaration* where it is noted that the *Komatsu et al.* reference uses solution polymerization techniques, which are fundamentally different from the emulsion polymerization techniques that are used to fabricate the latex binders of the present invention. Specifically, the *Komatsu et al.* reference uses a single-phase

polymerization process where the monomer components are polymerized in an acetone solvent medium. The resulting polymer is dissolved in the reaction medium. *See, March 2007*

Declaration at paragraphs 6-7:

6. In contrast to the above noted emulsion polymerization techniques, the primary reference cited by the Examiner, '317 *Komatsu*, discloses solution polymerized polymers. Solution polymerization techniques are fundamentally different from emulsion polymerization, and generally involve dissolving the monomer components in an organic solvent and initiating the polymerization, where the reaction components and polymer product are dissolved in the organic solution. In solution polymerization processes, there is typically only one phase.
7. Specifically, the '317 *Komatsu* reference discloses salt-sensitive polymers that are polymerized by dissolving the monomers in a miscible acetone/water mixture, where after polymerization, the solvent is evaporated off such that the polymer is dispersed in the water component. Although the *Komatsu* patent refers to the polymer that is dispersed in water as an "emulsion" it is clear that the polymer is not emulsion polymerized, nor does it contain a colloid component or other stabilizers, both features that are embodied in the subject matter of the pending claims. The compositions in *Komatsu* are therefore not "emulsions" within the meaning of the pending application.

The *Komatsu et al.* reference teaches that the organic solvent used to polymerize the resin is distilled off, and water added, to leave the polymer component dispersed in the water portion. This is referred to as an "emulsion" form; however it is clear a water soluble polymer is involved. *See, '317 Komatsu et al.* at Col. 5, lines 25-40, reproduced below:

After the completion of the reaction, the organic solvent is mainly distilled off, while water is kept in the reaction solvent as far as possible. Therefore, the distillation is preferably conducted at a temperature ranging from the boiling point of the organic solvent to 140° C., such as 70° to 140° C., preferably 70° to 100° C. under a pressure ranging from reduced pressure of 20 mmHg to atmospheric pressure. Water is added when the amount of the organic solvent in the mixed solvent has been reduced to 5% or less, preferably 1% or less. Although the amount of water to be added is not particularly limited, it is preferably such that the water content of the reaction system is 100 to 900 parts by weight, more preferably 150 to 500 parts by weight, for 100 parts by weight of the polymer. In the presence of such an amount of water, the polymer easily self-disperses in water to form an emulsion.

See, also, Col. 6, lines 19-31. Although *Komatsu et al.* refers to this composition as an “emulsion,” it is not emulsion polymerized as recited in the pending claims, nor is it stabilized by polymeric colloids or any other stabilizing agents.

In contrast to the polymerization procedures described in *Komatsu et al.* which are *inoperable* in the presence of polyvalent salts, the latex polymers of the claimed invention are the emulsion polymerized in the presence of mono di, or trivalent salts, whereby a stabilizing agent is dispersed in water to form a plurality of nanometer-sized micelles which encapsulate the monomers and create a dispersed phase where the polymerization proceeds. *See, March 2007 Declaration* at paragraph 5 and paragraph 27 of the application as filed:

The process for producing salt sensitive emulsions of the invention involves the formation of a colloid stabilizer, followed by an emulsion polymerization using said stabilizer by means known in the art. The stabilizer may either be formed in situ, or added separately. A useful process for producing the salt sensitive emulsions is found in U.S. Patent Application Ser. No. 09/540,033 [now United States Patent No. 6,683,129], incorporated herein by reference. The emulsion polymerization may be a batch, semi-batch, or continuous process.

Applicant also notes that the emulsion polymerization processes used to make the latex binder of the invention impart critical structure and attributes to the polymer, and ultimately to the non-woven web, which are important in salt-sensitive binder applications, and readily distinguish it from similar resins which are solution polymerized such as those described by *Komatsu et al.*

Komatsu et al. teaches away from the invention in numerous aspects, notably in that it teaches to use solution polymers rather than latexes. The Court in *In re Geisler* 43 USPQ2d 1362, 1365 (CAFC 1997) stated that even a *prima facie* case of obviousness is rebutted if it is shown that the art teaches away in any material respect and/or there are unexpected results. *Note, also*, page 57,529 of the Oct. 10 *Federal Register* Vol. 72, No. 195 appearing under the heading “Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. V. Teleflex Inc.*”:

Note that combining known prior art elements is not sufficient to render the claimed invention obvious if the results would not have been predictable to one of ordinary skill in the art.⁴⁸ “When the prior art teaches away from combining certain known elements, discovery of successful means of combining them is more likely to be nonobvious.”⁴⁹

⁴⁸ *United States v. Adams*, 383 U.S. 39, 51–52, 148 USPQ 479, 483 (1966). In *Adams*, the claimed invention was to a battery with one magnesium electrode and one cuprous chloride electrode that could be stored dry and activated by the addition of plain water or salt water. Although magnesium and cuprous chloride were individually known battery components, the Court concluded that the claimed battery was nonobvious. The Court stated that “[d]espite the fact that each of the elements of the Adams battery was well known in the prior art, to combine them as did Adams required that a person reasonably skilled in the prior art must ignore” the teaching away of the prior art that such batteries were impractical and that water-activated batteries were successful only when combined with electrolytes detrimental to the use of magnesium electrodes. *Id.* at 42–43, 50–52, 148 USPQ at 480, 483.

Moreover, the binder system used in connection with the invention has superior properties. Note paragraphs 8, 9 of the *March 2007 Declaration*:

8. Additionally, the emulsion polymers produced according to the invention have a significantly different structure than solution polymers, even after the polymer composition coalesces into a film on a nonwoven web. Without being bound by a theory, it is believed the emulsion polymers form films by coalescence of discrete polymer particles which are separated by the stabilizing agent; this results in relatively weak bonds. Weaker bonds are advantageous in applications where water dispersibility is required. With solution polymerized resins, the polymer chains mix and entangle during film formation. The weak bonds formed by the emulsion polymer are fundamental to its dispersibility in

tap water. For example, unlike the prior art, large amounts of extremely hydrophilic monomers such as acrylic acid are not needed to provide a water-dispersible composition. Less hydrophilic monomers such as methacrylic acid may be used which generally accommodates emulsion polymerization techniques better. Accordingly, in his technical opinion the compositions described in the '317 *Komatsu* reference are not remotely suggestive of the latex polymer binder used in the non-woven material of the invention.

9. The use of emulsion polymerized resins (referred to simply as "emulsion polymers," or the like, in the pending application) has significant advantages over solution polymerized resins. For example, emulsion polymerized resins exhibit a much lower viscosity for a given solids content. Example 1 of *Komatsu* reports a solids content of 17.9 % and a viscosity of 500 cps, whereas the colloid stabilized emulsion resin of Example 11 in the '129 *Eknoian* patent has a solids content of 29.7 % and only has a viscosity of 136 cps. Moreover, because the viscosities are so low, the emulsion product can be prepared and shipped at an extremely high solids content, which is advantageous from an economic perspective. Additionally, because the emulsion polymerization occurs in the dispersed phase of an aqueous medium, no solvent is required to dissolve the components. This is highly preferred, because there is no need to evaporate off excess organic solvents which are detrimental to the environment.

All rejections based on *Komatsu et al.* should be reversed.

1. Claims 8, 10, 13 and 18-23 are also novel and nonobvious over *Komatsu et al.* '317 because a colloid stabilizer is required.

Claims 22 and 23 (from which Claims 8, 10, 13 and 18-21 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious by *Komatsu et al.* which does not recognize that a colloid stabilizer can be critical to salt-sensitivity.

2. Claim 27 is also novel and nonobvious over *Lau* because of divalent ion resistance.

One of the surprising results found in connection with the present invention is that divalent ions, such as those found in “hard” water do not inhibit re-dispersibility. That feature is embodied in Claim 27 which is also patentable over the art by virtue of this feature. The Examiner argues that the *Komatsu et al.* ‘317 admission that the solution polymers described there are rendered inoperable as salt sensitive binders by contact with divalent ions refers only to an intermediate is manifestly incorrect. Col. 4 of *Komatsu et al.* clearly states that the polymers, after neutralization, coagulate in the presence of divalent ions :

**Examples of the inorganic salts to be added after the neutralization of the acrylic acid moiety of the polymer include neutral inorganic salts comprising a monovalent
55 cation such as sodium chloride, potassium chloride, sodium bromide, sodium sulfate and potassium sulfate. When a salt comprising a polyvalent cation such as a calcium salt or magnesium salt is added, the polymer is coagulated to make the formation of the self-dispersing emulsion impossible.**

After neutralization the binders are fully formed and ready for use. The ‘317 reference clearly teaches away from the subject matter of Claim 27 in that it notes that divalent ions are detrimental to salt-sensitivity of the solution binders of *Komatsu et al.* If “coagulated”, the resins are certainly not re-dispersible. The reference must be taken to mean what it says--When a salt comprising a polyvalent cation such as a calcium salt or magnesium salt is added, the polymer is coagulated to make the formation of the self-dispersing emulsion *impossible*.

- C. Claims 8, 10, 13, 18-23, 26, and 27 are nonobvious over *Komatsu et al.* in view of *Lau*.

The Examiner has cited no motivation to combine *Komatsu et al.* and *Lau*. This is contrary to the Guidelines for Examination noted earlier:

To reject a claim based on this rationale, Office personnel must resolve the Graham factual inquiries. Office personnel must then articulate the following:

(1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; ...

Even if one made the combination, an incomplete reconstruction of the claimed subject matter results, inasmuch as neither reference discloses or suggests salt sensitive latexes that break up into particles in the presence of tap water.

1. Claims 8, 10, 13 and 18-23 are also novel and nonobvious over *Komatsu et al.* in view of *Lau* because a colloid stabilizer is required.

Claims 22 and 23 (from which Claims 8, 10, 13 and 18-21 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious by *Komatsu et al.* with or without *Lau*, because neither reference recognizes that a colloid stabilizer can be critical to salt-sensitivity re-dispersibility.

2. Claim 27 is also novel and nonobvious over *Komatsu et al.* in view of *Lau* because of divalent ion resistance.

One of the surprising results found in connection with the present invention was that the products of this invention was that divalent ions, such as those found in “hard” water do not inhibit re-dispersibility. That feature is embodied in Claim 27 which is also patentable over the art by virtue of this feature for the reasons noted earlier.

D. Claims 2-6, 9, 11, 12, 16, and 25 are nonobvious over Lau in view of United States Patent No. 5,976,694 to Tsai et al.

This rejection is contrary to the Examination guidelines noted above in that no motivation is provided to make the combination of references proposed. Even if the combination were made, an incomplete reconstruction of the invention results since a salt sensitive latex is absent from all of the references.

United States Patent No. 5,976,694 to *Tsai et al.* is directed to compositions which allegedly provide significantly improved processability during the production of thermoformable articles comprising water-sensitive polymers. The compositions comprise a blend of at least one water-sensitive polymer and at least one polymer selected from polylactide, polyolefin-grafted with one or more polar groups, such as maleic anhydride, and other aliphatic polyesters. Desirably, the water-sensitive polymer comprises one or more copolyesters. The compositions may be spun into monocomponent or multicomponent fibers through conventional processes, such as spunbonding and meltblowing processes. The compositions may also be extruded to form films and other thermoformable articles. There is nothing in *Tsai et al.* '694 that supplements the *Lau* or *Komatsu et al.* references discussed above in any meaningful way and accordingly, all claims should be allowed.

Furthermore, Claims 22 and 23 (from which Claims 2-6, 9, 11, 12, 16 and 25 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious by *Lau* in view of *Tsai et al.* which does not recognize that a colloid stabilizer can be critical to salt-sensitivity re-dispersibility.

E. Claims 2-6, 9, 11, 12, 16 and 25 are nonobvious over Komatsu et al. in view of Tsai et al.

This rejection is contrary to the Examination guidelines noted above in that no motivation is provided to make the combination of references proposed. Even if the combination were

made, an incomplete reconstruction of the invention results since a salt sensitive latex is absent from all of the references as noted above.

Claims 22 and 23 (from which Claims 2-6, 9, 11, 12, 16 and 25 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious because no reference teaches that a colloid stabilizer can be critical to salt-sensitivity as is noted above.

F. Claims 2-6, 9, 11, 12, 16 and 25 are nonobvious over *Komatsu et al.* in view of *Lau* and in further view of *Tsai et al.*

This rejection is contrary to the Examination guidelines noted above in that no motivation is provided to make the combination of references proposed. Even if the combination were made, an incomplete reconstruction of the invention results since a salt sensitive latex is absent from all of the references as noted above.

Claims 22 and 23 (from which Claims 2-6, 9, 11, 12, 16 and 25 depend) contain recitation as to dispersibility in tap water and nondispersibility in salt, as well as colloid stabilizer. As such, the claimed subject matter is not disclosed or rendered obvious because no reference teaches that a colloid stabilizer can be critical to salt-sensitivity as is noted above.

G. The Rejections Fail to Consider the Declaration Evidence as Required by *In re Alton* and should be reversed for this reason as well

The July, 2007 *Declaration* of Steven P. Pauls, directly addresses the Examiner's comments as to the *Lau* '266 and *Komatsu et al.* '317 references at paragraphs 5 and 6 of the *Declaration*:

5. That United States Patent No. 5,521,266 does not contain a description of an emulsion polymerized polymer which is dispersible in water such that a film breaks into small pieces and can be filtered out. Examples 1-3 of the '266 patent involve solution polymers which dissolve in water and accordingly

cannot be dispersible as defined above. Examples 4 and 5 of the '266 patent involve emulsion polymers having the composition of Table 4.2, Col. 15 of the '266 patent:

TABLE 4.2

Emulsion Polymer	LA	LMA	BA	MMA	MAA	2-EHA	VA	
1C-E (Comparative)	50	0	0	49	1	0	0	20
2C-E (Comparative)	0	45	10	44	1	0	0	
1-E	20	0	25	54	1	0	0	25
2-E	40	0	20	39	1	0	0	
3-E	40	0	3	56	1	0	0	
4-E	40	0	0	59	1	0	0	
5-E	45	0	0	54	1	0	0	
6-E	50	0	0	49	1	0	0	
7-E	50	0	48	0	2	0	0	30
8-E	98	0	0	0	2	0	0	
9-E	0	20	30	49	1	0	0	
10-E	0	20	35	44	1	0	0	
11-E	0	35	5	64	1	0	0	
12-E	0	35	0	64	1	0	0	
13-E	0	40	39	20	1	0	0	35
14-E	0	40	10	49	1	0	0	
15-E	0	40	29	30	1	0	0	
16-E	0	40	5	54	1	0	0	
17-E	0	40	0	59	1	0	0	
18-E	0	45	15	39	1	0	0	
19-E	0	45	10	44	1	0	0	
20-E	0	45	0	54	1	0	0	40
21-E	0	50	0	49	1	0	0	
22-E	0	50	48	0	2	0	0	
23-E	20	0	0	0	0	0	80	
24-E	0	20	0	0	0	0	80	
25-E	0	0	10	44	1	45	0	
26-E	0	0	20	0	0	0	80	45

Note that the polymers are mostly alkylated organic esters and contain only 0, 1 or 2% methacrylic acid. Based on his experience, it is clear to him that these emulsion polymers are not dispersible in water, nor would their dispersibility change in response to salt concentration. Accordingly, the products of the Present Invention are not suggested by their reference in any way.

- As opposed to emulsion polymerization techniques, the '317 *Komatsu et al.* reference discloses solution polymerized polymers. Solution polymerization techniques are fundamentally different from emulsion polymerization, and generally involve dissolving the monomer components in an organic solvent and initiating the polymerization, where the reaction components and polymer product are dissolved in the organic solution. In solution polymerization

processes, there is typically only one phase. It is readily apparent that the polymers described in the '317 *Komatsu et al.* patent are not "dispersible" in the sense defined above. That is, that a film can be broken into small pieces and filtered out. Rather, the polymers described simply dissolve in water. He has reviewed the '317 *Komatsu et al.* patent carefully and it is clear to him that the binder resins described in the patent are water soluble. The abstract of the patent, for example, states that the polymers are water soluble in tap water, such that they could not be filtered out:

Disclosed is a process for producing a self-dispersing and salt-sensitive polymer by polymerizing the following monomers (A), (B) and (C) in a total concentration of 25 % by weight or above:

(A) 35 to 65 % by weight of acrylic acid,

(B) 10 to 45 % by weight of a vinyl monomer represented by the following general formula [I]:



wherein R^1 represents a hydrogen atom or a methyl group; and R^2 represents an alkyl group having 8 to 12 carbon atoms, and

(C) 20 to 45% by weight of a vinyl monomer represented by the following general formula [II]:



wherein R^3 represents a hydrogen atom or a methyl group; and R^4 represents an alkyl group having 2 to 4 carbon atoms in a mixed solvent comprising 50 to 90% by weight of an organic solvent having a solubility parameter of $10 \text{ (cal/cm}^3)^{1/2}$ or below and miscible with water and 50 to 10% by weight of water, neutralizing 2 to 15 molar % of the acrylic acid moiety of the polymer, distilling off the organic solvent while water is left, and further adding water thereto. The polymer produced by the process is soluble in tap water, but insoluble in an aqueous salt solution of a low concentration such as 0.2% aqueous salt solution. In case the polymer is used as a binder for a non-woven fabric or paper, it exhibits satisfactory strength and permeability to a body fluid when the resultant product is wet with the body fluid.

Such statements cannot be simply dismissed as the Examiner has done in this case. Statements of fact by an expert must be given due weight. *In re Alton*, 37 USPQ2d 1578, 1583 is *apropos*:

Additionally, the examiner interpreted the Wall declaration as offering opinion evidence, rather than factual evidence, on the adequate written description issue. The Wall declaration's assertion that "[m]odifying the residue at position 81 would have no effect on [disulfide bridge formation] because neither [asparagine]

nor lysine can participate in disulfide bridge formation" is a factual statement, however. So too is the statement that changing the amino acid at position 81 would involve a modification in subunit IF-2, "requiring an entirely separate series of manipulations of the complete [amino acid] sequence to generate this different class of analog." We do not read the declaration as asserting an opinion on the patentability of the claimed IFN- α analog. Rather, the declaration is offering factual evidence in an attempt to explain why one of ordinary skill in the art would have understood the specification to describe the modification involving the deletion of the first three amino acids independently of the modification at position 81. Dr. Wall's use of the words "it is my opinion" to preface what someone of ordinary skill in the art would have known does not transform the factual statements contained in the declaration into opinion testimony. Consequently, the examiner's dismissal of the declaration on the grounds that "[l]ittle weight is given an opinion affidavit on the ultimate legal question at issue" was error.

Ignoring the factual *Declaration* evidence in this case is grounds for reversal and all claims should be allowed. Even a *prima facie* case (not so on this record) is not a stone wall against which evidence is tested; patentability is determined by a preponderance of all the evidence.

H. All claims should also be allowed in view of the unexpected, superior results observed

The New Guidelines set forth by the Office for patentability determinations specifically provide:

Objective evidence relevant to the issue of obviousness must be evaluated by Office personnel. Such evidence, sometimes referred to as "secondary considerations," may include evidence of commercial success, long-felt but unsolved needs, failure of others, and ***unexpected results***. The evidence may be included in the specification as filed, accompany the application on filing, or be provided in a timely manner at some other point during prosecution. The weight to be given any objective evidence is decided on a case- by-case basis. The mere fact that an applicant has presented evidence does not mean that the evidence is dispositive of the issues of obviousness. (emphasis provided) *See* Fed. Reg. Vol. 72, No. 195, Wednesday, Oct. 10, 2007 at page 57527.

It is respectfully submitted that the record in this case is replete with unexpected, superior results including abundant examples. However, the Examiner has not objectively evaluated such evidence.

In this regard, the Board's attention is drawn to the *Declaration of John C. Parsons*, dated September 12, 2005 a copy of which is attached in Appendix IX . *Note* particularly paragraph 6:

It is unexpected based on his experience, and based on *Cole et al.* that emulsion binders including polymers which are not fully *water-soluble* can form emulsion residue binders which readily *disperse in water* but that the *dispersibility is salt-sensitive* as is claimed in the above referenced application. This is a superior result because of the enhanced processability of emulsion binders and their shipping and handling advantages noted above. The result is unexpected because the non-water soluble polymers of the present invention have much lower water solubility than the acrylic acid, highly water soluble polymers disclosed by *Cole et al.*, for example; yet the binders are nevertheless dispersible in tap water and non-dispersible in salt solution. One of skill in the art would not expect this result; especially because of the fact the polymers are not water soluble.

Cole et al. is at least as pertinent as *Lau* and *Komatsu et al.*, the primary references in this case.

Evidence of unexpected results, as is seen in connection with the present invention, is particularly compelling. That evidence needs to be evaluated as directed by *In re Soni* (34 USPQ2d 1684, 1687 and following (CAFC 1995):

Mere improvement in properties does not always suffice to show unexpected results. In our view, however, when an applicant demonstrates substantially improved results, as Soni did here, and states that the results were unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary. Soni, who owed the PTO a duty of candor, made such a showing here. The PTO has not provided any persuasive basis to question Soni's comparative data and assertion that the demonstrated results were unexpected. Thus, we are persuaded that the Board's finding that Soni did not establish unexpected results is clearly erroneous.

The cases cited by the dissent are not to the contrary. Neither *De Blauwe*, nor *Wood*, nor *Lindner* requires a showing of unexpectedness separate from a

showing of significant differences in result. Nor does Merck, which involved compositions understood to differ only in "a matter of degree." Those are not the facts here, where substantially improved properties were shown. Given a presumption of similar properties for similar compositions, substantially improved properties are ipso facto unexpected. The difficulty postulated by the dissent in distinguishing substantial from insubstantial improvement is no greater than the PTO and the courts have encountered, successfully, for many years in making judgments on the question of obviousness. It is not unworkable; it is simply the stuff of adjudication. Nor does it change established burdens of proof. The PTO here established a prima facie case, the applicant responded to it with a showing of data, and the PTO made an inadequate challenge to the adequacy of that showing.

CONCLUSION

Material improvements which provide new and useful results are patentable. In this case, the inventor has made a significant advance in salt sensitive, flushable products for which meaningful patent protection should be granted. *Note In re Wright*, 122 USPQ 522, 524 (CCPA 1959):

Though the court may have believed that each of the elements in the patented device was old, it does not follow that the combination was unpatentable. We need not elaborate upon the rule that a novel combination of old elements which so cooperate with each other so as to produce **a new and useful result** or a substantial increase in efficiency, is patentable. See *Lewyt Corp. v. Health-Mor, Inc.*, 7 Cir., 181 F.2d 855, 85 USPQ 335, certiorari denied 340 U.S. 823, 71 S.Ct. 57, 95 L.Ed. 605, 87 USPQ 432; *Blaw-Knox Co. v. Lain Co.*, 7 Cir., 230 F.2d 373, 108 USPQ 356. *Weller Manufacturing Company v. Wen Products, Inc.*, 7 Cir., 231 F.2d 795, 798, 109 USPQ 73, 75 (1956).

The art rejections in this case are based on impermissible hindsight and should be reversed.

The plentiful evidence of record showing unexpected, superior results warrants allowance.

For all of the above reasons, the outstanding rejections should be reversed and this case passed to issue.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mw Ferrell". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Michael W. Ferrell
Reg. No. 31,158

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June 9, 2008

VIII. CLAIMS APPENDIX

1. (Canceled)
2. (Previously presented) The non-woven material of claim 23, wherein said fibers have a length of less than 5 cm.
3. (Previously presented) The non-woven material of claim 23, wherein said fibers have a length of less than 2 cm.
4. (Previously presented) The non-woven material of claim 23, comprising 50 to 98 percent by weight of fibers.
5. (Previously presented) The non-woven material of claim 23, comprising 70 to 85 percent by weight of fibers.
6. (Previously presented) The non-woven material of claim 23, wherein said non-woven material has a binder add-on of from 2 to 50 percent by weight.
7. (Canceled)
8. (Previously presented) The non-woven material of claim 23, wherein said binder further comprises at least one component selected from the group consisting of plasticizers, tackifiers, fillers, humectants, surfactants, salts, fragrances, pigments, titanium dioxide, and encapsulated components.
9. (Previously presented) The non-woven material of claim 23, having a web basis weight of from 20 to 200 gsm.
10. (Previously presented) A non-woven article comprising the non-woven material of claim 23.

11. (Previously presented) The non-woven article of claim 9, further comprising a lotion containing at least one ingredient selected from the group consisting of sodium chloride solution, preservatives, boric acid, bicarbonates, moisturizers, emollients, surfactants, humectants, alcohols, water, and fragrances.
12. (Previously presented) The non-woven article of claim 9, further comprising at least 0.5 percent by weight of inorganic salt, or a mixture of inorganic salts.
13. (Previously presented) The non-woven material of claim 23, wherein said material has a wet tensile strength in 3 percent aqueous inorganic salt solution of at least 100 g/in, and a wet tensile strength in tap water of at least 40 g/in.
14. (Canceled)
15. (Canceled)
16. (Previously presented) The non-woven material according to claim 25, wherein the web includes wood pulp fibers which have a length of less than 0.5 cm.
17. (Canceled)
18. (Previously presented) The nonwoven material according to claim 22, wherein the hydrophilic monomer is selected from the group consisting of an acidic monomer containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof.
19. (Previously presented) The nonwoven material according to claim 22, wherein the hydrophilic monomer is selected from the group consisting of acrylic acid, methacrylic acid, and combinations thereof.

20. (Previously presented) The nonwoven material according to claim 22, wherein the non-hydrophilic monomer is selected from the group consisting of (meth)acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof.
21. (Previously presented) The nonwoven material according to claim 22, wherein the non-hydrophilic monomer includes (meth)acrylates.
22. (Previously presented) non-woven material comprising:
- a) a web of fibers; and
 - b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer
 - and
 - ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

23. (Previously presented) A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes at least one hydrophilic monomer selected from the group consisting of acidic monomers containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof; and at least one non-hydrophilic monomer selected from the group consisting of (meth) acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof,
 - and
 - ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

24. (Previously Presented) The non-woven material according to claim 23, wherein the colloid is present in the latex polymer in amounts of from 1 to 75 weight percent based on polymer solids.

25. (Previously Presented) The non-woven material according to claim 23, wherein the web of fibers are airlaid fibers including wood pulp fibers which have a length of less than 2 cm.

26. (Previously presented) A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

27. (Previously presented) A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that

can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt; and

wherein the films are further characterized in that divalent ions do not inhibit redispersibility in water.

IX. EVIDENCE APPENDIX

Additional evidence of patentability, five (5) *Declarations Under 37 CFR §1.132* and *§1.131* have been submitted in this case:

1. A *Declaration Under 37 CFR §1.132* of Steven J. Pauls dated July 23, 2007. This *Declaration* was entered into the record on July 24, 2007 according to the PAIR system.
2. A *Declaration Under 37 CFR §1.132* of Steven J. Pauls dated March 2, 2007. This *Declaration* was entered into the record on March 6, 2007 according to the PAIR system.
3. A *Declaration Under 37 CFR §1.132* of Steven J. Pauls dated October 24, 2006. This *Declaration* was entered into the record on October 26, 2006 according to the PAIR system.
4. A *Declaration Under 37 CFR §1.131* of Steven J. Pauls dated May 24, 2006. This *Declaration* was entered into the record on May 30, 2006 according to the PAIR system.
5. A *Declaration Under 37 CFR §1.132* of John C. Parsons dated September 12, 2005. This *Declaration* was entered into the record on September 14, 2005 according to the PAIR system.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

John C. Parsons

U.S. Serial No. 09/883,520

Filed: June 18, 2001

Docket No. 1931.VIN (EM-05-2)

For: WATER DISPERSIBLE, SALT
SENSITIVE NONWOVEN MATERIALS

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Examiner: Peter Y. Choi

Group Art Unit: 1771

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 CFR 1.132

Steven P. Pauls, co-inventor of the subject matter of the above-noted patent application hereby declares that:

1. He has worked in the field of polymer technology for twenty-five (25) years, and that he is a co-inventor of the pending '520 application referenced above (sometimes referred to hereafter simply as the "Present Invention"), which is directed to fibrous webs having salt-sensitive latex binders. He has previously submitted *Declarations* in support of patentability in this case.
2. He understands from Counsel that the claims pending in the above-noted case have been rejected over prior art, specifically that United States Patent No. 5,521,266 to

Lau et al. and United States Patent No. 5,631,317 to *Komatsu et al.* have been applied as novelty-destroying.

3. He makes this *Declaration* on personal knowledge of the facts stated herein.
4. Along with copending US Patent Application No. 09/540,033 (now US Patent No. 6,683,129 to *Eknoian*), the invention in the pending case represents a significant advancement in salt-sensitive technology because the salt-sensitive resins are made by emulsion polymerization. The Present Invention relates to nonwoven webs which include a salt-sensitive latex polymer binder that comprises a polymer component which is typically emulsion polymerized in the presence of a colloid stabilizer. The claims have been amended to specify that films of the binder employed are dispersible rather than water soluble in that a film formed breaks into small discrete particles that can be filtered and in Claim 27 that film formed of the binder is further characterized in that divalent ions do not inhibit redispersibility in water. Claim 22 as amended, and Claim 27 are representative:

22. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer

and

- ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-

dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

27. A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises a polymer component which includes from 1 to 100 weight percent of a hydrophilic monomer, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer; and

wherein said latex polymer composition forms films that are dispersible rather than soluble in tap water in that a film formed from the polymer breaks into small discrete particles that can be filtered out, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt; and

wherein the films are further characterized in that divalent ions do not inhibit redispersibility in water.

The invention is thus directed to non-woven webs which retain their strength in the presence of a salt-containing medium, but readily disperse in tap water such that they may be flushed after use. The emulsion polymers utilized in connection with the Present Invention have a significantly different structure than solution polymers, even after the polymer composition coalesces into a film on a nonwoven web. Without being bound by a theory, it is believed the emulsion polymers form films by coalescence of discrete polymer particles which are separated by the stabilizing agent; this results in relatively weak bonds. Weaker bonds are advantageous in applications where water dispersibility is required. With solution polymerized resins, the polymer chains mix and entangle during film formation. The weak bonds formed by the emulsion polymer are fundamental to its dispersibility in tap water. For example, unlike the prior art, large amounts of extremely hydrophilic monomers such as acrylic acid are not needed to provide a water-dispersible composition. Less hydrophilic

monomers such as methacrylic acid may be used which generally accommodates emulsion polymerization techniques better.

5. That United States Patent No. 5,521,266 does not contain a description of an emulsion polymerized polymer which is dispersible in water such that a film breaks into small pieces and can be filtered out. Examples 1-3 of the '266 patent involve solution polymers which dissolve in water and accordingly cannot be dispersible as defined above. Examples 4 and 5 of the '266 patent involve emulsion polymers having the composition of Table 4.2, col. 15 of the '266 patent:

TABLE 4.2

Emulsion Polymer	LA	LMA	BA	MMA	MAA	2-EHA	VA	
1C-E (Comparative)	50	0	0	49	1	0	0	20
2C-E (Comparative)	0	45	10	44	1	0	0	
1-E	20	0	25	54	1	0	0	25
2-E	40	0	20	39	1	0	0	
3-E	40	0	3	56	1	0	0	
4-E	40	0	0	59	1	0	0	
5-E	45	0	0	54	1	0	0	
6-E	50	0	0	49	1	0	0	
7-E	50	0	48	0	2	0	0	30
8-E	98	0	0	0	2	0	0	
9-E	0	20	30	49	1	0	0	
10-E	0	20	35	44	1	0	0	
11-E	0	35	5	64	1	0	0	
12-E	0	35	0	64	1	0	0	
13-E	0	40	39	20	1	0	0	35
14-E	0	40	10	49	1	0	0	
15-E	0	40	29	30	1	0	0	
16-E	0	40	5	54	1	0	0	
17-E	0	40	0	59	1	0	0	
18-E	0	45	15	39	1	0	0	
19-E	0	45	10	44	1	0	0	
20-E	0	45	0	54	1	0	0	40
21-E	0	50	0	49	1	0	0	
22-E	0	50	48	0	2	0	0	
23-E	20	0	0	0	0	0	80	
24-E	0	20	0	0	0	0	80	
25-E	0	0	10	44	1	45	0	
26-E	0	0	20	0	0	0	80	45

Note that the polymers are mostly alkylated organic esters and contain only 0, 1 or 2% methacrylic acid. Based on his experience, it is clear to him that these emulsion

polymers are not dispersible in water, nor would their dispersibility change in response to salt concentration. Accordingly, the products of the Present Invention are not suggested by their reference in any way.

6. As opposed to emulsion polymerization techniques, the '317 *Komatsu* reference discloses solution polymerized polymers. Solution polymerization techniques are fundamentally different from emulsion polymerization, and generally involve dissolving the monomer components in an organic solvent and initiating the polymerization, where the reaction components and polymer product are dissolved in the organic solution. In solution polymerization processes, there is typically only one phase. It is readily apparent that the polymers described in the '317 *Komatsu* patent are not "dispersible" in the sense defined above. That is, that a film can be broken into small pieces and filtered out. Rather, the polymers described simply dissolve in water. He has reviewed the '317 *Komatsu* patent carefully and it is clear to him that the binder resins described in the patent are water soluble. The abstract of the patent, for example, states that the polymers are water soluble in tap water, such that they could not be filtered out:

Disclosed is a process for producing a self-dispersing and salt-sensitive polymer by polymerizing the following monomers (A), (B) and (C) in a total concentration of 25 % by weight or above:

(A) 35 to 65 % by weight of acrylic acid,

(B) 10 to 45 % by weight of a vinyl monomer represented by the following general formula [I]:



wherein R^1 represents a hydrogen atom or a methyl group; and R^2 represents an alkyl group having 8 to 12 carbon atoms, and

(C) 20 to 45% by weight of a vinyl monomer represented by the following general formula [II]:



wherein R^3 represents a hydrogen atom or a methyl group; and R^4 represents an alkyl group having 2 to 4 carbon atoms in a mixed solvent comprising 50 to 90% by weight of an organic solvent having a solubility parameter of $10 \text{ (cal/cm}^3)^{1/2}$ or below and miscible with water and 50 to 10% by weight of water, neutralizing 2 to 15 molar % of the acrylic acid moiety of the polymer, distilling off the organic solvent while water is left, and further adding water thereto. The polymer produced by the process is soluble in tap water, but insoluble in an aqueous salt solution of a low concentration such as 0.2% aqueous salt solution. In case the polymer is used as a binder for a non-woven fabric or paper, it exhibits satisfactory strength and permeability to a body fluid when the resultant product is wet with the body fluid.

7. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and

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that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

Dated 23-July-2007


Steven P. Pauls, Sr.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

John C. Parsons

U.S. Serial No. 09/883,520

Filed: June 18, 2001

Docket No. 1931.VIN

For: WATER DISPERSIBLE, SALT
SENSITIVE NONWOVEN MATERIALS

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Examiner: Peter Y. Choi

Group Art Unit: 1771

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450**DECLARATION UNDER 37 CFR 1.132**

Steven P. Pauls, co-inventor of the subject matter of the above-noted patent application hereby declares that:

1. He has worked in the field of polymer technology for 24 years, and that he is a co-inventor of the pending '520 application referenced above (sometimes referred to hereafter simply as the "present inveniton"), which is directed to fibrous webs having salt-sensitive latex binders.
2. That he understands from counsel that the claims have been rejected over United States Patent No. 5,631,317 to *Komatsu* and United States Patent No. 5,976,694 to *Tsai*, and that he is familiar with the references used in making those rejections.

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Additionally, he understands that the claims have been rejected as non-enabling with respect to the claimed glass transition temperature range.

3. That he makes this *Declaration* on personal knowledge of the facts stated herein.
4. The Present Invention relates to nonwoven webs which include a salt-sensitive latex polymer binder that comprises a polymer component which is emulsion polymerized in the presence of a colloid stabilizer. New claim 23 is reproduced below:

23. (New) A non-woven material comprising:

- a) a web of fibers; and
- b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:
 - i) a polymer component which includes at least one hydrophilic monomer selected from the group consisting of acidic monomers containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof; and at least one non-hydrophilic monomer selected from the group consisting of (meth) acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof,
 - and
 - ii) a polymeric colloid component, wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and wherein said latex polymer composition forms films that are dispersible in tap water, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

The invention is thus directed to non-woven webs which retain their strength in the presence of a salt-containing medium, but readily disperse in tap water such that they may be flushed after use.

5. That, along with copending US Patent Application No. 09/540,033 (now US Patent No. 6,683,129 to *Eknoian*), the invention in the pending case represents a significant advancement in salt-sensitive technology because the salt-sensitive resins are made by emulsion polymerization. Emulsion polymerization techniques are described briefly as follows. Generally, in emulsion polymerization processes, a stabilizing

agent is provided to an aqueous medium where the stabilizing agent may include surfactants, emulsifiers, protective colloids or the like; the latex binders in the inventive compositions include at least a protective colloid as a stabilizer. The stabilizing agent has structure which typically includes both a hydrophilic portion and a hydrophobic portion such that the stabilizer orients in the reaction medium to form a plurality of "micelles" in the reaction medium which are generally spherical cell-like structures each having a size of from about 25 to 200 nm. When the monomer charge and initiator are added to the reaction medium, the polymerization proceeds within the micelles. The product latex that is produced by this process comprises a plurality of small polymer particles surrounded by the stabilizing agent, which are dispersed in the aqueous medium. Emulsion polymerization techniques are known in the art and are described in detail in the '033 application.

6. In contrast to the above noted emulsion polymerization techniques, the primary reference cited by the Examiner, '317 *Komatsu*, discloses solution polymerized polymers. Solution polymerization techniques are fundamentally different from emulsion polymerization, and generally involve dissolving the monomer components in an organic solvent and initiating the polymerization, where the reaction components and polymer product are dissolved in the organic solution. In solution polymerization processes, there is typically only one phase.
7. Specifically, the '317 *Komatsu* reference discloses salt-sensitive polymers that are polymerized by dissolving the monomers in a miscible acetone/water mixture, where after polymerization, the solvent is evaporated off such that the polymer is dispersed in the water component. Although the *Komatsu* patent refers to the polymer that is dispersed in water as an "emulsion" it is clear that the polymer is not emulsion polymerized, nor does it contain a colloid component or other stabilizers, both features that are embodied in the subject matter of the pending claims. The compositions in *Komatsu* are therefore not "emulsions" within the meaning of the pending application.

8. Additionally, the emulsion polymers produced according to the invention have a significantly different structure than solution polymers, even after the polymer composition coalesces into a film on a nonwoven web. Without being bound by a theory, it is believed the emulsion polymers form films by coalescence of discrete polymer particles which are separated by the stabilizing agent; this results in relatively weak bonds. Weaker bonds are advantageous in applications where water dispersibility is required. With solution polymerized resins, the polymer chains mix and entangle during film formation. The weak bonds formed by the emulsion polymer are fundamental to its dispersibility in tap water. For example, unlike the prior art, large amounts of extremely hydrophilic monomers such as acrylic acid are not needed to provide a water-dispersible composition. Less hydrophilic monomers such as methacrylic acid may be used which generally accommodates emulsion polymerization techniques better. Accordingly, in his technical opinion the compositions described in the '317 *Komatsu* reference are not remotely suggestive of the latex polymer binder used in the non-woven material of the invention.
9. The use of emulsion polymerized resins (referred to simply as "emulsion polymers," or the like, in the pending application) has significant advantages over solution polymerized resins. For example, emulsion polymerized resins exhibit a much lower viscosity for a given solids content. Example 1 of *Komatsu* reports a solids content of 17.9 % and a viscosity of 500 cps, whereas the colloid stabilized emulsion resin of Example 11 in the '129 *Eknoian* patent has a solids content of 29.7 % and only has a viscosity of 136 cps. Moreover, because the viscosities are so low, the emulsion product can be prepared and shipped at an extremely high solids content, which is advantageous from an economic perspective. Additionally, because the emulsion polymerization occurs in the dispersed phase of an aqueous medium, no solvent is required to dissolve the components. This is highly preferred, because there is no need to evaporate off excess organic solvents which are detrimental to the environment.
10. Regarding the enablement of the pending claims with respect to the glass transition temperature element, the Declarant reiterates from his previous *Declaration* that it

would be within the general knowledge of those skilled in the polymer arts to produce a resin with the claimed glass transition temperature of -40°C to 105°C. In this regard, see **Exhibit A** attached hereto from Ullmann's Encyclopeida of Industrial Chemistry, Sixth, Revised Edition, v. 28, pp. 13-14 at section 4.2.

4.2. Properties of the Polymers

Glass Transition Temperature. The glass transition temperatures (T_g) of polyacrylates and homopolymers of monomers that are frequently used in acrylate copolymers are summarized in Table 8. The values were determined by differential thermoanalysis on dispersion films (heating rate 20 °C/min, midpoint), the films being repeatedly heated until reproducible values were obtained. Other factors that influence the glass transition temperature (e.g., molecular mass, [103], [104]) are discussed elsewhere [105], [106].

The glass transition temperature of most copolymers can be accurately calculated with the nonlinear equation of GORDON and TAYLOR [107] given below. Other nonlinear equations are discussed elsewhere [108].

$$T_g = \frac{T_{gA}w_A + cT_{gB}w_B}{w_A + cw_B}$$

where w_A and w_B are the mass fractions of the monomers A and B, and T_{gA} and T_{gB} are the absolute glass transition temperatures of the corresponding homopolymers ($T_{gA} < T_{gB}$). The constant c takes into account the expansion coefficients of the melt and glass state of the two homopolymers. Its value is generally between 0.5 and 2.0.

With the exception of *tert*-butyl acrylate, most acrylate homopolymers have extremely low glass transition temperatures. They are therefore too soft, too tacky, or have too high an elongation and insufficient strength for many areas of application. Polymers for specific applications can be produced by copolymerization with monomers whose homopolymers have high glass transition temperatures (e.g., styrene, acrylonitrile, methyl methacrylate, ethyl methacrylate).

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As stated in Exhibit A, the glass transition temperature of a polymer can be accurately predicted by the monomer components, *i.e.*, by selecting various "hard" and "soft" monomers. This relationship is well known in the art. Furthermore, while the glass transition temperature of the latex polymers used in the invention will be somewhat effected by the polymeric colloid, the composition of the polymer will predominantly influence the Tg value. In any event, in his technical opinion, latex polymers having the claimed Tg could be readily produced by a person of ordinary skill in the art without undue experimentation.

11. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

Dated 02-Mar-2007


Steven P. Pauls, Sr.

Ullmann's Encyclopedia of Industrial Chemistry

Sixth, Completely Revised Edition

Volume 28

Polyacrylates
to
Polyurethanes

 WILEY-VCH

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Polyacrylates
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Polymers, Electricall

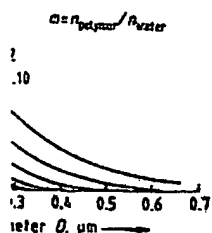
Cross Reference

Poly(Acrylic Acids)
Poly(Acrylic Acids) :
Polyacrylic Fibers →
Organic 13
Polyalkenamers → R
Poly(Alkylene Glycc
Polyoxyalkylenes
Polyamide Fibers →
Organic 13
Polybicycloheptene
Polyblends → Polyn
Polybutadiene → R
Polybutenes → Poly
Polybutylenes → Po
Poly(Butylene Terep
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Polyether Rubber →
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High-Temperatur
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Polyoxymethylen
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Polyethylene → Pol
Poly(Ethylene Glyc
Polyoxyalkylene:
Polyethylencimine
Poly(Ethylene Oxid
Poly(Ethylene Tere
Polyformaldehyde

2-Ethylhexyl acrylate	
not regulated	
500 mg/24 h, mild	
500 mg/24 h, mild	
5660	
8460	

For determining the mean value the light transmission is used. The relationship between particle radius of spheres theory [83]. The particle function of the light transmission is an important parameter is refractive index of the polymer approximate refractive index can be calculated with the

indices $w_1 + w_2 + w_3 \dots = 1$ and indices of the homopoly-



between light transmission and polymer dispersion (path length)

size can also be determined by scattering (measurement)

range: 300–1500 nm). Hydrodynamic diameters can be accurately measured by *quasielastic light scattering* (QELS); measurement range: 10–3000 nm) [84–88].

The particle size distribution can be determined with the *ultracentrifuge* (measuring range: 10–20000 nm in a gravity field of 20–200000 g) [89]. The particles must be spherical.

The surface areas of latex (dispersion) particles are determined by *soap titration*, from which the particle size can be calculated [90–93]. Soap titration is simple and quick to perform, and yields reasonable values with homologous polymer dispersion series. Care should be taken, however, when evaluating latex surfaces of different hydrophilicity.

Viscosity. Dispersions with solids contents of 40–60 wt % exhibit a broad spectrum of rheological behavior [94], [95] that depends on the volume fraction, temperature, particle size, particle size distribution, and auxiliary system. Dispersions may be highly liquid to pasty, and may exhibit a Newtonian to viscoelastic flow behavior [96]. In dispersions structural viscosity ("shear thinning") is frequently observed; dilatancy is observed less often; thixotropy and rheopexy are rarely encountered.

Stability. Dispersions must have a certain degree of mechanical (shear) stability if coagulation is not to occur during pumping, stirring, or spraying. Mechanical stability is checked by determining the amount of coagulate after a stirring test; the stirrer, temperature, shear velocity, time, and other parameters should correspond to possible stresses occurring during use.

Thermal stability is checked by subjecting the dispersions to the anticipated service temperature conditions. A freeze–thaw test with five cycles is widely used. However, the results depend on the container size and temperature control so that the correlation between laboratory results and frost stability under relevant weathering conditions is generally unsatisfactory.

The polymer dispersion must be stable to electrolytes when diluted with hard water and when formulating products such as paints or adhesives. The stability is therefore tested by adding salts.

Minimum Film-Forming Temperature. Whether a dispersion forms a coherent film after evaporation of the water or whether a brittle, pulverizable layer is formed depends on the glass transition temperature of the polymer, residual water content, and temperature at which the film is formed. The lowest temperature at which a coherent film can still form from the copolymer dispersion is called the minimum film-forming temperature (MFT). The MFT is measured with a metal plate that has a temperature gradient [97], [98]. The temperature at which the film begins to crack or the so-called white point, at which the turbid film starts to become clear, is measured [99].

The MFT depends on the copolymer composition, as well as the particle size and polarity of the comonomers [100–102]. It is usually comparable to the glass transition temperature, but may be substantially lower, probably because the emulsifier and water act as a plasticizer.

4.2. Properties of the Polymers

Glass Transition Temperature. The glass transition temperatures (T_g) of polyacrylates and homopolymers of monomers that are frequently used in acrylate copolymers are summarized in Table 8. The values were determined by differential thermoanalysis on dispersion films (heating rate 20 °C/min, midpoint), the films being repeatedly heated until reproducible values were obtained. Other factors that influence the glass transition temperature (e.g., molecular mass, [103], [104]) are discussed elsewhere [105], [106].

The glass transition temperature of most copolymers can be accurately calculated with the nonlinear equation of GORDON and TAYLOR [107] given below. Other nonlinear equations are discussed elsewhere [108].

$$T_g = \frac{T_{gA}w_A + cT_{gB}w_B}{w_A + cw_B}$$

where w_A and w_B are the mass fractions of the monomers A and B, and T_{gA} and T_{gB} are the absolute glass transition temperatures of the corresponding homopolymers ($T_{gA} < T_{gB}$). The constant c takes into account the expansion coefficients of the melt and glass state of the two

Table 8. Properties of homopolymers

Monomer	CAS registry no. of polymer	T_g , °C	d_4^{25}	n_D^{25}
Methyl acrylate	[9003-21-8]	22	1.20	1.479
Ethyl acrylate	[9003-32-1]	-8	1.13	1.464
<i>n</i> -Propyl acrylate	[24979-82-6]	-25	1.10	1.462 ^b
<i>n</i> -Butyl acrylate	[9003-49-0]	-43	1.06	1.474
Isobutyl acrylate	[26335-74-0]	-17	1.05	1.464 ^b
<i>sec</i> -Butyl acrylate	[10347-35-4]	-6	1.06	1.462 ^b
<i>tert</i> -Butyl acrylate	[25237-27-3]	55	1.03	1.468
<i>n</i> -Hexyl acrylate	[27103-47-5]	-51	0.98	1.468 ^b
2-Ethylhexyl acrylate	[9003-77-4]	-58	0.99	1.433 ^b
Lauryl acrylate	[26246-92-4]	-17	0.99 ^c	1.468 ^b
Methyl methacrylate	[9011-14-7]	105	1.19	1.488
Ethyl methacrylate	[9003-42-3]	67	1.12	1.483
<i>n</i> -Butyl methacrylate	[9003-63-8]	32	1.06	1.483
Isobutyl methacrylate	[9011-15-8]	64	1.05	1.475
<i>tert</i> -Butyl methacrylate	[25189-00-8]	102	1.02	1.460
<i>n</i> -Hexyl methacrylate	[25087-17-6]	-14	1.01	1.479
Acrylonitrile	[25014-41-9]	105	1.18	1.519
Methacrylonitrile	[25067-61-2]	112	1.18	1.545 ^b
Styrene	[9003-33-6]	107	1.05 ^d	1.591 ^d
<i>trans</i> -1,4-Butadiene	[40022-02-4]	-107	0.97	1.518
<i>cis</i> -1,4-Butadiene	[40022-03-5]	-102	1.01	1.52
Vinyl acetate	[9003-20-7]	42	1.19	1.463
Vinyl propionate	[25035-84-1]	8	1.14	1.465 ^b
Vinyl chloride	[9002-86-2]	77 ^e	1.40	1.545
Vinylidene chloride	[9002-83-1]	-18 ^f	1.84 ^g	1.618 ^{b, g}
Acrylic acid	[9003-01-4]	130 ^b	1.54 ^c	1.544 ^b
Methacrylic acid	[25087-26-7]	162 ^h	1.45 ^c	1.563 ^b
Acrylamide	[9003-05-8]	220 ^b	1.44 ^c	1.607 ^b
Methacrylamide	[25014-12-4]	243 ^b	1.40 ^c	1.616 ^b

^a Emulsion polymers or aqueous solution polymers, differential scanning calorimetry, 20 °C/min, midpoint. ^b From the refractive increment. ^c From the specific volume. ^d Atactic. ^e Polymerization temperature 90 °C. ^f Amorphous. ^g Crystalline. ^h After repeated heating.

homopolymers. Its value is generally between 0.5 and 2.0.

With the exception of *tert*-butyl acrylate, most acrylate homopolymers have extremely low glass transition temperatures. They are therefore too soft, too tacky, or have too high an elongation and insufficient strength for many areas of application. Polymers for specific applications can be produced by copolymerization with monomers whose homopolymers have high glass transition temperatures (e.g., styrene, acrylonitrile, methyl methacrylate, ethyl methacrylate).

Molecular Mass. See also → Plastics, Analysis, Chap. 5. The molecular mass can be calculated from the intrinsic viscosity $[\eta]$ and a knowledge of the two constants K and a :

$$[\eta] = K \cdot M^a$$

Values for K and a in various solvents are listed in Table 9.

Molecular mass determination does not generally present any difficulties with solution polymers. With acrylate emulsion polymers, however, cross-linking of the dispersed particles may cause problems. In this case it is impossible to produce a molecular-dispersed solution. Before the molecular mass is determined it must therefore be checked whether a true dilute solution exists.

Mechanical Properties of Polymer Films.

The temperature dependence of mechanical moduli [112], [113] provides detailed information about the mechanical behavior and structure of polymer films. Stress-strain diagrams

Table 9. Determination of the m

Polymer	Tetrahydrofuran (100)	$K \times 10^3$, cm ³ /g
Poly(methyl acrylate)	10.0	(
Poly(ethyl acrylate)	8.9	(
Poly(<i>n</i> -propyl acrylate)	11.9	(
Poly(<i>n</i> -butyl acrylate)	7.4	(
Poly(isobutyl acrylate)	12.7	(
Poly(<i>tert</i> -butyl acrylate)	43.4	(
Poly(<i>n</i> -hexyl acrylate)	5.5	(
Poly(2-ethylhexyl acrylate)	11.1	(
Poly(<i>n</i> -lauryl acrylate)	27.3	(

of polymer films [114] tional apparatus; rupture at break are thus obtained relatively high degree of films, however, due to often more appropriate for a specific elongation occurs when a defined sure of the stress-strain moduli can be accurately tensile tests with sr

Poly(methyl acrylate) low elongation at break rupture strength at room temperature of poly(ethyl acrylate) and the rupture strength Poly(ethyl acrylate) is berlike. The elongation is extremely high and low; the films are not flow even at small be freely handled. Poly an even higher elongation strength.

Tackiness. Poly(methyl acrylate) is only slightly tacky at room temperature.



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

John C. Parsons

U.S. Serial No. 09/883,520

Filed: June 18, 2001

Docket No. 1931.VIN

For: WATER DISPERSIBLE, SALT
SENSITIVE NONWOVEN MATERIALS

Examiner: Arden B. Sperty

Group Art Unit: 1771

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 CFR 1.132

Steven P. Pauls, co-inventor of the subject matter of the above-noted patent application hereby declares that:

1. He has worked in the field of polymer technology for 24 years, and that he is a co-inventor of the pending '520 application referenced above (sometimes referred to hereafter simply as the "pending application"), which is directed to fibrous webs having emulsion binders which include salt-sensitive resins.
2. That the pending application states on page 6 that the salt-sensitive polymers which are used in the webs of the invention may be fabricated according to United States

Patent Application Serial No. 09/540,033, which is also incorporated by reference into the pending application. Moreover, the '033 applicaiton has now issued as US Patent No. 6,683,129 to *Eknoian*.

3. That he understands from counsel that claims 1, 14, and 15 of the pending application have been amended to recite specific types of hydrophilic and hydrophobic monomers, and to recite that the salt-sensitive polymer is colloid-stabilized. Claim 1, reproduced below, is representative:

Amended claim 1. A non-woven material comprising:

- a) a web of fibers; and
- b) an emulsion binder comprising a colloid-stabilized, tap water-dispersible polymer, wherein said colloid stabilized, tap water-dispersible polymer is non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt, and wherein said colloid stabilized, tap water-dispersible polymer comprises from 1 to 100 percent by weight of a hydrophilic monomer selected from the group consisting of acidic monomers containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof, and from 0 to 99 percent by weight of at least one non-hydrophilic monomer selected from the group consisting of (meth)acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof, wherein said polymer has a Tg of from -40°C to +105°C, and wherein said binder comprises an aqueous emulsion residue which exhibits salt sensitive dispersibility in tap water.

4. That he understands from counsel, that new claim 17 has been added, directed to nonwoven materials having an emulsion binder whose monomer components are selected and present in amounts needed to provide salt-sensitivity. Claim 17 is reproduced below for reference.

Claim 17. A non-woven material comprising:

- a) a web of fibers; and
- b) an emulsion binder which includes an aqueous, colloid stabilized emulsion residue which comprises from 1 to 100 percent by weight of a hydrophilic monomer and from 0 to 99 percent by weight of at least one non-hydrophilic monomer, wherein said hydrophilic monomers and said hydrophobic monomers are selected and present in amounts such that the aqueous, colloid stabilized emulsion residue is dispersible in water, yet non-

dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

5. That, in his opinion, a person ordinarily skilled in the art of emulsion resins, given the disclosure in the pending application and the '033 application, would be able to make and use the webs claimed in the pending application without undue experimentation.
6. That the pending application, in addition to disclosing working examples, lists specific examples of suitable hydrophilic monomers, other ethylenically unsaturated comonomers, and protective colloids, which may be used to make the salt-sensitive polymers that are included in the emulsion binder composition.
7. Furthermore, to supplement the guidance given in the pending application, the '033 application was incorporated therein by reference. The '033 application provides extensive knowledge directed to making suitable salt-sensitive polymers, including 23 working examples. The examples are summarized in the table in the '033 application, reproduced below for reference.

Monomer Composition	Surfactant	Substrate	Solubility Tap 3% NaCl
60 MAA/25 BA/15 2EHA	Yes	Glass, Hair, Wood	Yes No
60 MAA/25 BA/15 2EHA	No	Glass, Hair, Wood	Yes No
50 MAA/30 BA/20 2EHA	Yes	Glass	Yes No
30 MAA/40 BA/30 2EHA	No	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 VA	Yes	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 VA	No	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 MOM	Yes	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 MOM	No	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 MAH	Yes	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 MAH	No	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 AMPS	Yes	Glass	Yes No
60 MAA/25 BA/15 2EHA/5 AMPS	No	Glass	Yes No
50 VA/50 MOM	No	Glass	No No
40 VA/10 MOM/30 MAA	No	Glass	Yes No
70 MAA/20 BA/10 2EHA	Yes	Glass	Yes No
70 MAA/20 BA/10 2EHA	No	Glass	Yes No
60 MAA/25 BA/15 MMA	Yes	Glass	Yes No
60 MAA/25 BA/15 MMA	No	Glass	Yes No
60 MAA/25 BA/15 MMA/5 AMPS	Yes	Glass	Yes No
60 MAA/25 BA/15 MMA/5 AMPS	No	Glass	Yes No
54 MAA/6 AA/25 BA/15 MMA	Yes	Glass	Yes No
54 MAA/6 AA/25 BA/15 MMA	No	Glass	Yes No
54 MAA/6 AA/25 BA/15 MMA/5 MOM	Yes	Glass	Yes No
54 MAA/6 AA/25 BA/15 MMA/5 MOM	No	Glass	Yes No

As can be seen from the above table, the '033 application discloses numerous embodiments of salt-sensitive emulsion polymers having a wide variety of different monomers. For example, the hydrophilic monomers recited in independent claims 1, 14, and 15 are exemplified in the '033 application by the inclusion of carboxylic acid and sulfonic acid monomers. The '033 application also discloses specific examples of the non-hydrophilic monomers recited in the claims, including alkyl acrylates, methacrylates, maleates, and vinyl esters. Moreover, the '033 employs resins which contains the hydrophilic and hydrophobic monomers in widely varying amounts.

8. That, in addition to the above examples, the '033 application provides abundant disclosure regarding suitable monomers, monomer amounts, molecular weight values,

emulsion polymerization techniques among other information useful to the production of suitable salt-sensitive polymers.

9. As of the filing date of the pending application, salt-sensitive polymers, *per se*, were known, such as those described in the Lion Corporation patents (US Patent Nos. 5,631,317; 5,317,063; and 5,312,883). Similarly, it was generally known at the time the pending application was filed, that the hydrophilic monomer/non-hydrophilic monomer balance in these resins could be adjusted to make polymers with different salt-sensitive behavior. The '033 application was significant in the field of salt-sensitive technology because it described how to make salt-sensitive resins as emulsions. Accordingly, while the choice and amounts of monomers should be carefully selected to achieve optimal performance for a particular application, the choice and relative amounts of hydrophilic monomer and non-hydrophilic monomers to make the colloid stabilized polymer salt-sensitive would be a matter of routine, or at least not require a great deal of trial when provided with the information contained in the pending application and '033 application. Indeed, a wide variety of monomers could be used to make salt-sensitive polymers.
10. Likewise, that it would be within the general knowledge of those skilled in the polymer arts to make a resin with the claimed glass transition temperature of -40°C to 105°C. That the T_g of the polymer can be easily controlled by the monomer composition, based on the T_g of the individual monomers.
11. Accordingly, in his technical opinion, a skilled artisan with knowledge of the above disclosures and with general knowledge in the art of salt-sensitive resins, could readily make and use the inventive webs to the full extent of the claimed subject matter without excessive experimentation, including the fabrication of suitable salt-sensitive resins having the compositions and properties recited in claims 1, 14, and 15. New claim 17 is also, in his opinion, enabled to its full scope because the pending application and the '033 application provide ample disclosure of suitable monomers, monomer amounts, and polymerization techniques. Additionally, given the general knowledge in the art at the time of filing that the hydrophilic/non-hydrophilic balance

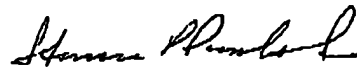
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could be controlled to adjust the salt-sensitivity, the relative amounts of the monomers to use would not require a great deal of experimentation.

12. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

Dated 24 October - 2006



Steven P. Pauls, Sr.

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: :
Parsons et al. : Examiner: Arden B. Sperty
U.S. Serial No. 09/883,520 : Group Art Unit: 1771
Filed June 18, 2001 :
Docket No. 1931.VIN :
For: WATER DISPERSIBLE, SALT
SENSITIVE NONWOVEN MATERIALS :

Commissioner for Patents
PO Box 1450
Alexandria, VA
22313-1450

DECLARATION UNDER 37 CFR 1.131

Steven P. Pauls, Sr., co-inventor of the subject matter of the above-noted patent application hereby declares that:

1. He has worked in the field of polymer technology for 24 years, and that he is a co-inventor of the pending '520 application referenced above. That the pending application is directed to nonwoven webs which have a salt-sensitive emulsion binder.
2. That he understands from Counsel that the pending claims have been rejected over (1) United States Patent No. 6,683,129 to *Eknoian*, which has an effective date as a reference of March 31, 2000; and (2) United States Patent No. 6,562,892 to *Eknoian et al.*, which has an effective date as a reference of March 30, 2001.

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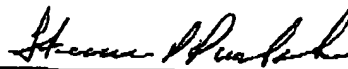
3. That he makes this *Declaration* on personal knowledge of the facts stated herein.
4. That prior to March 31, 2000, the invention of the above-noted patent application was reduced to practice. Specifically, salt sensitive emulsion binders were provided to nonwoven webs for testing purposes, where the emulsion polymers were non-dispersible in salty solutions, and dispersible in water. The nonwoven webs were tested according to the invention, and specifically, the samples included all of the features of, for example, independent claims 1 and 14 of the pending application.
5. Attached to this Declaration are (redacted) pages 1, 4, and 5 of a laboratory notebook dated prior to March 31, 2000 confirming the manufacture of the nonwoven product described in paragraph 3 above. Page 1 of the notebook outlines the compositions of the polymers used and page 4 describes the process by which the emulsions resins were provided onto Whatman #4 Chromatography paper, which is a nonwoven substrate. As can be seen on page 4, the polymers included hydrophilic monomers such as methacrylic and acrylic acid, and non-hydrophilic monomers such as butyl acrylate and methyl methacrylate. It is further noted at the top of page 4 that the objective of the experiment is to measure the water and salt sensitivity of each resin. Finally, it can be seen on page 5 of the notebook that the polymers exhibit salt-sensitivity, such that the paper has higher tensile strengths in salt solutions than water.
6. Thus, in his opinion, it is clear from the record that the invention in the pending application was tested prior to March 31, 2000.
7. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and

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that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

Dated 24-May-2006



Steven P. Pauls, Sr.

NATIONAL STARCH

Nº 11421- 1

Project No.

Date Started

Object SPR Surface Segments

The EMULSION SAMPLES WERE SUBMITTED BY SPR FOR ANALYSIS OF SALT DRO WATER SENSITIVITY DIFFERENCES. MIKE ECKMAN IS THE CHEMIST RESPONSIBLE FOR SYNTHESIS OF THESE EMULSIONS.

I am submitting the following 7 samples for evaluation, once again we are mainly interested in the tensile strength. Could you also run a control sample under the same conditions so we can directly compare ours to the "benchmark". Here are the analyticals for the submitted samples along with the composition:

	Composition	% Solids	pH	Viscosity	Grit
10630-12 B	MAA/AA/BA/MMA	29.6	2.1	13.5 cPs	0.009
10630-13 A	MAA/AA/BA	30.5	2.6	20	0.02
11234-68 B	MAA/AA/BA/MMA	29.8	2.7	16	0.03
11234-70 A	MAA/AA/MMA/BA/DOM	29.7	2.5	16	0.003
11234-70 B	MAA/AA/MMA/BA/MOM 30.0	→ 2.3 →	16 →	0.006 →	→
11234-70 C	MAA/AA/MMA/BA/AMPS	29.8			
11234-75 A	MAA/MMA/BA	29.3	2.1	14	0.004

For your information;

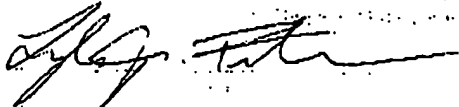
DOM - dioctyl maleate

MOM - monoctyl maleate

AMPS - ammonium AMPS

Please let me know if you need any more information or have any questions.

CPS

Sharon P. Ruckel


BEST AVAILABLE COPY

N^o 11421- 4

Saturations; Tensile Study

OBJECTIVE: USE THE SAMPLES, ACCORDING PAGE - 01 OF THIS NOTEBOOK, FOR SATURATIONS TO ASSESS THE WATER AND SALT SENSITIVITIES OF THESE EMULSIONS.

PROCEDURE: SATURATE THE WHATMAN FILTER PAPER, DRY IT, AND TEST 'WET' STRENGTH UNDER VARIOUS SOAPS.

1. CUT WHATMAN #4 CMA PAPER TO 7.5 x 23.5" (LENGTH); WEIGH TO 0.01 PLACES (CONDITIONED AT 23°C)
2. FORMULATE THE SAMPLES AS PER PAGE - 05 OF THIS NOTEBOOK.
3. DIP SATURATE ON THE WHEEL MATHIAS SATURATOR (1-982), WITH SETTING AT 6.602 PRESSURE AND 4.5 m/min. ROLL SPEED
4. DRY IN THREE AGES 210°F (1-1267)
5. RE-CONDITION TO 23°C, TRIM OFF EXCESS, AND CALCULATE % ADD-ON
6. CUT 24 @ 1 x 3.75" CMA TENSILES; WEIGH; CALCULATE BASIS WEIGHT IN gm/m²
7. SET-UP INSTRUMENT #5342 AS: 2" GAGE LENGTH 1"/min CROSSHEAD SPEED USE 20 LB LOAD CELL
8. SOAK TENSILES AS:
 - 1 minute in 4% NaCl Solution*
 - 1 minute in DEIONIZED WATER
 - 60 minutes in 4% NaCl Solution*
 - 60 minutes in DEIONIZED WATER
9. RECORD AVERAGE PEAK LOAD VALUE AND STANDARD DEVIATION
10. FOLLOW-UP WITH THE WORK ABOVE, ADDING SOAKS OF 1 minute AND 60 minutes in 3% NaCl soln

DATA:

	A	B	C	D	E	F	G	H
% ADD-ON	15.1	14.5	14.4	14.2	14.4	14.3	14.8	17.7
WEIGHT OF 24 x 1 x 3.75	6.117	6.035	6.071	6.106	6.060	6.038	6.146	6.345
BASIS WT gm/m ²	105.3	103.9	104.5	105.1	104.3	103.9	105.8	109.2

TENSILE → SEE OPPOSITE PAGE.

COMMENTS/CONCLUSIONS: THE 'F' SAMPLE (11234-70C) CONTAINS AMAS, AND APPEARS TO HAVE SIGNIFICANTLY MORE WATER SENSITIVITY THAN THE OTHERS, ESPECIALLY WITH A ONE-MINUTE SOAK. THIS MUST BE CONFIRMED. THE 'G' SAMPLE (11234-75A) CONTAINED NO ACQUIC ACID, AND HAD THE LEAST AMOUNT OF SALT WATER STRENGTH. THIS SHOULD BE EXAMINED FURTHER, IN COMPARING; CONTRASTING TO THE 11629-144A, WITH 30 AA.

Steven P. Puntis

[Signature]

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NATIONAL STARCH

Nº 11421- 5

Project No.

Date Started

Object CONTINUED FROM PAGE -04

Reference: 11421-04

Substrate: Whatman #4CHR

Polymer/Additive	CAS #	Solids	A	B	C	D	E	F	G	H
10630-12B		29.5%	86.4							
10630-13A		30.5%		83.6						
11234-68B		29.8%			85.6					
11234-70A		29.7%				85.9				
11234-70B		30.0%					85.0			
11234-70C		29.8%						85.6		
11234-75A		29.3%							87.0	
11629-144A		30.0%								85.0
Deionized Water	7732-18-5	0.0%	83.8	86.4	84.4	84.1	85.0	84.4	83.0	85.0
Bath pH			2.15	2.09	2.63	2.06	1.93	2.02	2.20	3.63
Bath Viscosity		cps	N/A							
Total Bath			150	150	150	150	150	150	150	150
Bath Solids			17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Total Solids			25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
Additives Factor			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Polymer Solids			25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
One Minute Soak	CMD 3% NaCl	(gf)	1806	2118	1650	1605	1814	1567	535	850
		(std dev)	18.6	156.9	36.5	26.7	19.9	62.2	3.8	44.6
One Minute Soak	CMD DI Water	(gf)	1525	1596	1409	1339	1603	597	486	426
		(std dev)	46.6	57.0	42.4	49.9	19.1	7.2	36.3	76.2
One Hour Soak	CMD 3% NaCl	(gf)	1154	1197	1019	1028	1041	764	442	174
		(std dev)	57.4	53.3	52.8	30.7	46.6	47.1	18.2	14.6
One Hour Soak	CMD DI Water	(gf)	867	938	779	770	795	517	310	111.9
		(std dev)	65.0	43.3	37.8	78.2	45.3	14.2	12.0	64.8
Three Hour Soak	CMD 3% NaCl	(gf)	1686	1712	1503	1528	1626	1455	1018	1133
		(std dev)	35.6	16.8	77.9	51.5	14.4	39.6	53.4	106.0
Three Hour Soak	CMD DI Water	(gf)	1359	1497	1444	1318	1597	1305	949	602
		(std dev)	168.0	52.3	39.0	82.3	7.1	40.7	10.6	34.4

WITNESS: *Steven Plunkett*

DATE: [REDACTED]

WITNESS THIS DOCUMENT AND UNDERSTAND ITS CONTENTS

[Signature]
Signature

Date

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: :
John C. Parsons et al. : Examiner: Arden B. Sperty
U.S. Serial No. 09/883,520 : Group Art Unit: 1771
Filed June 18, 2001 :
Docket No. 1931.VIN :
For: WATER DISPERSIBLE, SALT :
SENSITIVE NONWOVEN :
MATERIALS :
.....

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 CFR 1.132

John C. Parsons, co-inventor of the subject matter of the above-noted patent application hereby declares that:

1. That he was awarded a Master's degree in Chemistry from State University of New York at Oswego and a Bachelor's degree in Chemistry from Rensselaer Polytechnic Institute and has worked in the field of polymer technology for eleven years. That he is a co-inventor of the pending '520 application referenced above (the subject matter of which is sometimes referred to herein as "the present invention") and makes this declaration in support of patentability.

2. That he is familiar with the Official Action rejecting the pending claims of the above-noted patent application, dated May 23, 2005, as well as with United States Patent No. 6,444,214 to *Cole et al.*, which is the basis for the rejections made in the Official Action over prior art.

3. That *Cole et al.* describes nonwovens with water *soluble* binders made of *solutions* containing mostly *highly soluble* Acrylic Acid ("AA") polymers. The present invention, on the other hand, is directed to webs with *emulsion* residue binders that can *disperse* in water, but are salt-sensitive such that they do not disperse in salt solutions; an invention which is substantially different from and not, in his opinion, even remotely suggested by *Cole et al.* Amended Claim 1 is illustrative of the present invention:

1. A non-woven material comprising

- a) a web of fibers; and
- b) an emulsion binder comprising a tap water-dispersible polymer which is non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt, wherein said water-dispersible polymer comprises from 1 to 100 percent by weight of a hydrophilic monomer and from 0 to 99 percent by weight of at least one non-hydrophilic monomer, wherein said polymer has a Tg of from -40°C to +105°C, and wherein said *binder* comprises an *aqueous emulsion residue* which exhibits salt sensitive dispersibility in tap water.

4. That the binders employed in connection with the present invention are made of polymers which are not fully water-soluble, and therefore, can form emulsions in water as is claimed. Emulsions are different from solutions, and have certain advantages. For one, they have relatively low viscosity as compared with solutions of similar polymer content, reducing shipping and handling difficulties. Another advantage is emulsions are generally more stable than polymer solutions which are

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homogenous, one-phase mixtures, where all the components are blended within one another at the molecular level and which generally tend to separate over time, even under ideal conditions.

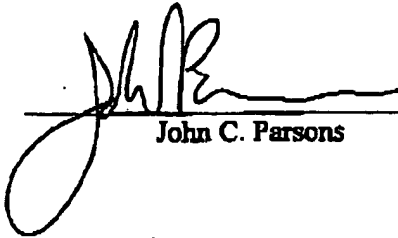
5. That he personally observed that the aqueous emulsion binder applied to nonwoven webs of the invention which include monomers such as Methacrylic Acid are readily dispersible in tap water containing less than 0.5 percent by weight salt, despite their relative low solubility and strong bonding to various fibrous substrates. This can be seen in Examples 1-8 of the pending application as filed.
6. It is unexpected based on his experience, and based on *Cole et al.* that emulsion binders including polymers which are not fully *water-soluble* can form emulsion residue binders which readily *disperse in water* but that the *dispersibility is salt-sensitive* as is claimed in the above referenced application. This is a superior result because of the enhanced processability of emulsion binders and their shipping and handling advantages noted above. The result is unexpected because the non-water soluble polymers of the present invention have much lower water solubility than the acrylic acid, highly water soluble polymers disclosed by *Cole et al.*, for example; yet the binders are nevertheless dispersible in tap water and non-dispersible in salt solution. One of skill in the art would not expect this result; especially because of the fact the polymers are not water soluble.

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7. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

Dated

September 12, 2005

John C. Parsons

X. RELATED PROCEEDINGS APPENDIX

There are no related appeals, interferences or judicial proceedings related to, or which will affect, or which will be affected by, or which will have a bearing on the Board's decision in this appeal.